

PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES
FOURTH SERIES

Vol. XXXIX, No. 21, pp. 501-506; 3 figs.

December 19, 1973

A NEW HAWAIIAN CHITON,
RHYSSOPLAX LINSLEYI
(MOLLUSCA: AMPHINEURA: CHITONIDAE)

By

Glenn E. Burghardt

*Steinhart Aquarium, California Academy of Sciences
San Francisco, California 94118*

It has always puzzled conchologists that the Hawaiian Islands, which are so rich in marine mollusks, are poor in species of chitons. Only four Hawaiian species are known: *Acanthochitona viridis* (Pease, 1871), *A. armata* (Pease, 1871), *Ischnochiton petaloides* (Gould, 1846), and the new species described below.

This new species has been known for some years but has gone unnamed until this time. The first specimens brought to the attention of the author were collected by Mrs. Harold Gudnason at Puu o Hulu Beach, near Maili, Oahu, Hawaii, in the intertidal waters at low tide (0.0') on February 26, 1965.

Rhyssoplax linsleyi Burghardt, new species.

(Figures 1-3.)

DIAGNOSIS. The surface of the valves, while appearing smooth to the naked eye, looks pitted when viewed under low magnification. Under high magnification however, it is clear that the surface is indeed smooth, the 'pitted' appearance being caused by a color pattern composed of marks shaped like small starbursts.

In addition to the pattern of 'pit marks,' the anterior valve has a series of between 26 and 36 (holotype has 36) shallow grooves which are weak and difficult to see unless viewed under side light. The interior of the valve has a series of 8 slits on the outer edge of the insertion plate. This edge is also finely pectinated, a feature typical of the family Chitonidae.

Intermediate valves have the lateral areas defined but not sharply raised.

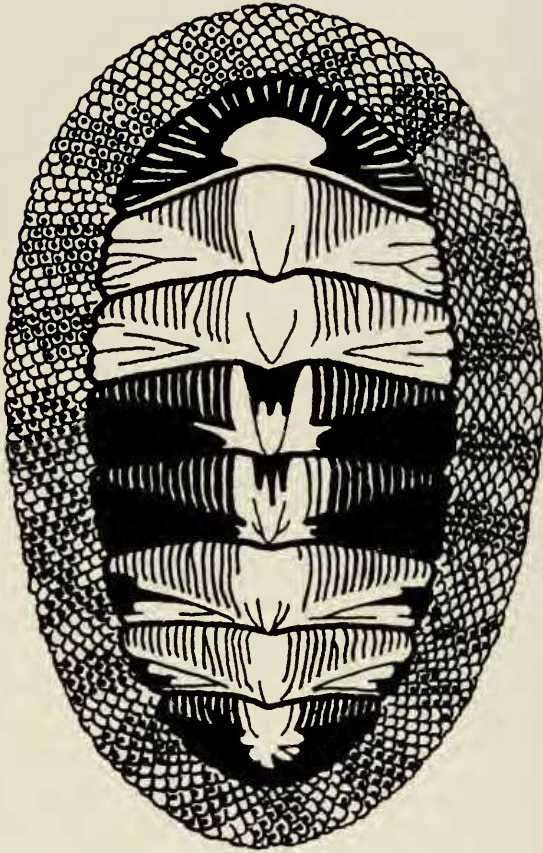


FIGURE 1. Holotype of *Rhyssoplax linsleyi*. Length 13.3 mm., width 8.4 mm., height 2.5 mm.; Puu o Hulu Beach, Oahu, Hawaii.

They possess the same radiating series of bifurcating grooves as does the anterior valve. Generally, these grooves are three in number (as in the holotype), but can be single on young specimens. The central areas of these valves are cut longitudinally with from 10 to 15 (13 in holotype) sharp lines. Both lateral and central areas have the 'pitted' color pattern. The dorsal ridge is smooth and shiny with the valves beaked. The jugal area is also smooth but shows the 'pit marks.' The outer margins of the insertion plates are pectinated and have a single slit.

The posterior valve appears smooth behind the slightly anterior mucro but also has the unique 'pitted' color pattern. This area has a series of from 23 to 32 (26 in holotype) shallow radial grooves similar to those of the

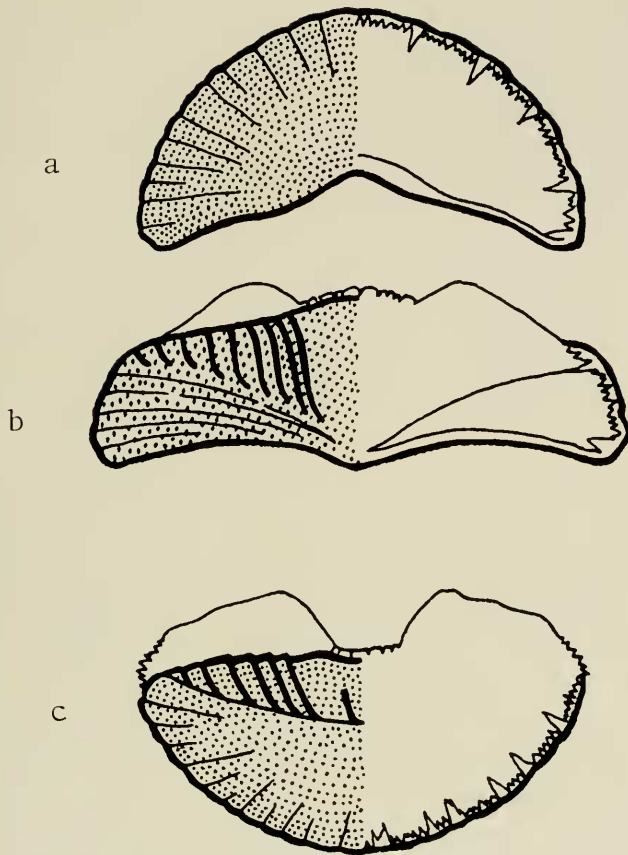


FIGURE 2. *Rhyssoplax linsleyi*: (a) anterior valve, (b) median valve, and (c) posterior valve. Shown are both the dorsal surface (left) and interior surface (right) of the valves.

anterior valve. The interior of this valve shows the same series of slits—here numbering 12—and pectinations as does the anterior valve.

DESCRIPTION. *Rhyssoplax linsleyi* is a small chiton, averaging 9.6 mm. in length (mean obtained from 116 specimens). It is fairly broad, with an average ratio of width to body length of 3:5. The valves are moderately arched, the average height being in a ratio of 1:5 to the body length.

The color of the valves is quite variable, ranging from a clean grey-white to a mottled black and white (holotype) or green and white. A few specimens in our sample were solid in color, either red or white, but such coloration appears to be rare. The color pattern occurs on both lateral and central areas. The interior of the valves is white with a slight bluish tint.

The girdle is of medium width and is covered with the fairly large, smooth



FIGURE 3. Map of Hawaiian Islands showing the collecting sites of *Rhyssoplax linsleyi* on the islands of Oahu, Maui, and Kauai: (1) Puu o Hulu (type locality), (2) Ala Moana, (3) Wainanalo, (4) Kuhuku Point, (5) Honolulu, and (6) Poipu Beach.

scales typical of Chitonidae. This girdle is cream with green bands except on the solid colored specimens, where the girdle matches the valves in color.

No radular studies were made.

TYPE LOCALITY. The type series was collected at Puu o Hulu Beach, near Maili, Oahu, Hawaii, on 26 February 1965, by Mrs. Harold Gudnason.

TYPE MATERIAL. *Holotype.* An adult specimen preserved in alcohol is deposited in the California Academy of Sciences Department of Invertebrate Zoology Type Series, no. 567. Measurements are 13.3 mm. in length, 8.4 mm. in width, 2.5 mm. in height.

Paratypes. Twenty-four paratypes collected with the holotype have been deposited in the mollusk type collections of the following museums and private collectors: Academy of Natural Sciences of Philadelphia, two specimens, ANSP 330098; Bernice P. Bishop Museum, two specimens, BPBM 206931; California Academy of Sciences, two specimens, CAS Geology 53956 (rearticulated), CASIZ type series no. 594; Los Angeles County Museum of Natural History, two specimens, LACM 1620; Museum of Comparative Zoology, two specimens, MCZ 272531; San Diego Natural History Museum, two specimens, SDSNH 62724, 62725; National Museum of Natural History, two specimens, USNM 735016; Glenn and Laura Burghardt, six specimens; Mrs. Harold Gudnason, four specimens.

DISCUSSION. This chiton has been collected from all sides of Oahu (Maili, Kahuku, Waimonalo, and Ala Moana). It has also been collected by Dr. Antonio Ferreira at Honolua Bay on the northwestern side of Maui, and by Dr. George Ramsay at Poipu Beach on the southern side of Kauai. It is found from the intertidal zone to a depth of 15 feet but not as an emergent species, as it has never been discovered completely exposed by the low tides. Generally, specimens can be found by turning small rocks, exposing the chitons clinging to the undersides.

Measurements of 116 specimens studied are as follows:

	Oahu (82 specimens)		Maui (34 specimens)	
	Range	Mean	Range	Mean
Length	3.5-14.5	8.0 mm.	7.0-21.0	13.4 mm.
Width	2.8- 6.2	4.9 mm.	4.0-12.4	8.2 mm.
Height	0.7- 2.9	1.8 mm.	—	—

According to Smith (1966) and Hyman (1967), many chitons brood their eggs and some even carry their young in the pallial cavity. Upon examining the specimens for this paper, I found that several were carrying eggs. The eggs were found to be slightly less than 0.2 mm. in diameter.

This new species belongs to the family Chitonidae Rafinesque, 1915, genus *Rhyssoplax* Thiele, 1893, the type species being the North African *Chiton affinis* Issel, 1869 (International Committee on Zoological Nomenclature, 1971, p. 18). The approximately 30 species of *Rhyssoplax* have been recorded from Africa, Japan, Australia, New Zealand, and now the distribution includes the Hawaiian Islands. No species of *Rhyssoplax* occurs on the Pacific coast of North America (Burghardt and Burghardt, 1969). Species in this group are sometimes referred to the genus *Anthochiton* Thiele, 1893, but Iredale (1914, p. 40) and Smith (1960, pp. 65-66) have referred *Anthochiton* to the synonymy of *Rhyssoplax* Thiele, 1893, which has been placed on the Official List of Generic Names in Zoology (International Committee on Zoological Nomenclature, 1971, p. 18).

Rhyssoplax linsleyi does not closely resemble any other described species. Its unique 'pitted' pattern, discussed above, distinguishes this species from all other *Rhyssoplax* known to date. Edmonson (1946, p. 118, fig. 546) mentions an undescribed chiton from Kanoeh Bay which undoubtedly belongs to *R. linsleyi*. In the Bishop Museum there are two lots of chitons which were labelled as a new species by Dall (BPBM no. 895.8 and 895.8a), but not published (personal communication, Mrs. H. Gudnason). These also represent *R. linsleyi*.

This new species is named in honor of Mrs. Gudnason's father, Earle G. Linsley, Honorary Associate in Astronomy, Bernice P. Bishop Museum and Planetarium (1957-1962).

The author wishes to express his thanks to Mr. Allyn G. Smith of the California Academy of Sciences for his review and assistance, to Mrs. Harold Gudnason for permission to work on her Oahu specimens, to Dr. Antonio Ferreira for permission to work on his Maui specimens, and to Betsy Harrison and Hilda Manzak for specimens used for this study; and a special thanks to wife, Laura, whose immeasurable help has made this paper possible. The figures were done by Roderick MacPherson.

LITERATURE CITED

BURGHARDT, GLENN, AND LAURA BURGHARDT

1969. Collector's Guide to West Coast Chitons. Special Publication No. 4, San Francisco Aquarium Society, 45 pp., 4 pls.

EDMONDSON, CHARLES H.

1946. Reef and shore fauna of Hawaii. Special Publication no, 22, Bernice P. Bishop Museum, 381 pp., 223 figs.

HYMAN, LIBBIE

1967. The Invertebrates. Vol. 6, Mollusca no. 1. Pp. 70-142, figs. 29-57. New York, McGraw Hill.

INTERNATIONAL COMMITTEE ON ZOOLOGICAL NOMENCLATURE

1971. Opinion 951. *Rhyssoplax* Thiele, 1893 (Amphineura): designation of a type-species under the plenary powers. Bulletin of Zoological Nomenclature, vol. 28, pts. 1 and 2, pp. 18-19.

IREDALE, TOM

1914. The chiton fauna of the Kermadec Islands. Proceedings of the Malacological Society of London, vol. 11, pp. 25-51, pls. I-II.

SMITH, ALLYN G.

1960. Amphineura. Pp. 41-76, figs. 33-45, *in*: R. C. Moore (Ed.), "Treatise on Invertebrate Paleontology," Part I, Mollusca 1. Lawrence, Kansas, Geological Society of America and University of Kansas Press.
1966. The larval development of chitons (Amphineura). Proceedings of the California Academy of Sciences, vol. 32, no. 15, pp. 433-446, 11 figs.